

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

---

The Prairie Naturalist

Great Plains Natural Science Society

---

6-2007

## Burrowing Owl Associations with Black-tailed Prairie Dog Colonies in Southwestern Kansas and Southeastern Colorado

Stephen L. Winter

Jack F. Cully Jr.

Follow this and additional works at: <https://digitalcommons.unl.edu/tpn>



Part of the [Biodiversity Commons](#), [Botany Commons](#), [Ecology and Evolutionary Biology Commons](#), [Natural Resources and Conservation Commons](#), [Systems Biology Commons](#), and the [Weed Science Commons](#)

---

This Article is brought to you for free and open access by the Great Plains Natural Science Society at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in The Prairie Naturalist by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

# Burrowing Owl Associations with Black-tailed Prairie Dog Colonies in Southwestern Kansas and Southeastern Colorado

STEPHEN L. WINTER<sup>1</sup> and JACK F. CULLY, JR.

Department of Natural Resources Ecology and Management, Oklahoma State  
University, Stillwater, OK 74078 (SLW)  
USGS-BRD, Kansas Cooperative Fish and Wildlife Research Unit, Kansas State  
University, Manhattan, KS 66506 (JFC)

**ABSTRACT** -- We quantified the use of black-tailed prairie dog (*Cynomys ludovicianus*) colonies as habitat for the burrowing owl (*Athene cunicularia*) in southwestern Kansas and southeastern Colorado. We used incidental sightings and breeding season avifauna surveys to document the presence of the burrowing owl on black-tailed prairie dog colonies, non-colonized rangeland, and cropland during the spring and early summer. Burrowing owl rarely was observed on non-colonized rangeland and cropland sites, and black-tailed prairie dog colonies appear to be used substantially as a habitat type for the burrowing owl in the region encompassing Cimarron and Commanche National Grasslands in Morton County, Kansas, and Baca County, Colorado, respectively.

**Key words:** *Athene cunicularia*, burrowing owl, black-tailed prairie dog, Colorado, conservation, *Cynomys ludovicianus*, Kansas.

The burrowing owl (*Athene cunicularia*) is a ground-dwelling owl of the grasslands and deserts of southcentral Canada, the western United States, Florida, Mexico, Central America, and the Caribbean (Haug et al. 1993). Western burrowing owl reportedly is capable of excavating its own burrows, which are used for roosting and nesting, but rarely do so, typically relying on the burrow-creating

---

<sup>1</sup>Corresponding author. E-mail address: [stephen.winter@okstate.edu](mailto:stephen.winter@okstate.edu)

activities of other animals (Haug et al. 1993). In the Great Plains, burrowing owl often uses burrows that have been abandoned by the black-tailed prairie dog (*Cynomys ludovicianus*) and will sometimes use burrows that are being used actively by the black-tailed prairie dog as well (Butts 1976, Haug et al. 1993, Desmond and Savidge 1999). Declining burrowing owl populations have been correlated with declining black-tailed prairie dog populations (Desmond et al. 2000). The use of black-tailed prairie dog colonies as habitat for burrowing owl populations in the Great Plains has been highlighted by others (Butts 1976, Desmond et al. 2000, Orth and Kennedy 2001, Sidle et al. 2001), but few studies simultaneously have quantified burrowing owl use of both black-tailed prairie dog colonies and non-colonized habitats (Butts and Lewis 1982, Desmond and Savidge 1996).

Some of the highest densities of burrowing owl recorded during North American Breeding Bird Surveys in the Great Plains are within an area encompassing southeastern Colorado, southwestern Kansas, and the Oklahoma panhandle (Sauer et al. 2005). During the period 1966-2005, the North American Breeding Bird Survey reports negative, but non-significant, trends for the burrowing owl throughout its range in North America, in the shortgrass prairie Bird Conservation Region as a whole, and in the states of North Dakota, South Dakota, Nebraska, Kansas, and Colorado (Sauer et al. 2005). During the same period in Oklahoma there has been a significant negative trend for burrowing owl (Sauer et al. 2005). Declines of specific populations of burrowing owl have been reported from multiple locations in the Great Plains (James and Espie 1997, 13 states and provinces; Desmond et al. 2000, Nebraska; Murphy et al. 2001, North Dakota).

Burrowing owl has been assigned a global conservation status rank of G4, which indicates the species is "apparently secure" throughout its range, although global short-term trends are negative (NatureServe 2006). In Kansas, the status of the burrowing owl as a breeding species is S3B (vulnerable), in Colorado its status is S4B (apparently secure), and in Oklahoma its status is S2 (imperiled; NatureServe 2006). In conjunction with comprehensive research examining the ecology of black-tailed prairie dog ecosystems in the shortgrass prairie landscapes of southwestern Kansas and southeastern Colorado (Kretzer 1999, Kretzer and Cully 2001a, Kretzer and Cully 2001b, Winter et al. 2002, Winter et al. 2003), we collected data to determine the use of black-tailed prairie dog colonies as habitat for the burrowing owl.

## METHODS

In 1996 and 1997, we collected data on habitat associations of burrowing owl in southwestern Kansas and southeastern Colorado. Data were collected on the Cimarron National Grassland in Morton County, Kansas, Comanche National Grassland in Baca County, Colorado, and on private lands adjacent to or near the

national grasslands in both counties. Study sites were located in upland areas characterized by loamy and silty loam soils within the Richfield-Ulysses association, with slopes from 0 to 6% (Dickey et al. 1963). Dominant vegetation of black-tailed prairie dog colonies in the study area consisted of the perennial grasses purple three-awn (*Aristida purpurea*), blue grama (*Bouteloua gracilis*), and buffalograss (*Buchloe dactyloides*) (Winter et al. 2002). The dominant vegetation of non-colonized rangeland consisted of blue grama and buffalograss, but in some cases sideoats grama (*Bouteloua curtipendula*) occurred as a co-dominant as well (Winter et al. 2002). Most private land surrounding Cimarron National Grassland in Kansas was cropped, but some areas remained in perennial grass cover and, as at the grasslands, most was grazed by cattle (*Bos taurus*). A higher proportion of private land surrounding Comanche National Grassland in Colorado remained in perennial grass cover and most of that was grazed by cattle as well.

From 22 May to 12 July, 1996, we recorded the location of all burrowing owl incidentally sighted during travel to and from field sites and during all field-work activities. The prevailing habitat type of each location was noted (black-tailed prairie dog colony, non-colonized rangeland, cropland; Winter 1999). These surveys were not systematic and observations of burrowing owl were located coincidentally to other activities. •

During 1996 and 1997, we recorded the presence of burrowing owl within strip transects (200 m wide) during breeding season (27 May to 18 June) avifauna surveys of black-tailed prairie dog colonies and non-colonized rangeland (Winter et al. 2003). Strip transects varied in length from 0.40 to 1.60 km. In 1996, we surveyed 12.5 km of transects on eight black-tailed prairie dog colonies and 8.5 km of transects at five non-colonized sites. In 1997, we surveyed 11.3 km of transects on 13 black-tailed prairie dog colonies and 23.3 km of transects at 14 non-colonized sites.

In 1997, we also recorded the presence of burrowing owl anywhere within a study location during breeding season avifauna surveys, regardless of whether the individuals were within or outside the 200 m strip transects used during the survey (Winter 1999). Black-tailed prairie dog study sites used during breeding bird surveys in 1997 represented approximately 555 ha of habitat, while non-colonized rangeland represented approximately 592 ha of habitat.

## RESULTS

In 1996, our incidental observations recorded burrowing owl at 22 black-tailed prairie dog colonies on 36 separate occasions. We observed burrowing owl on only two non-colonized rangeland sites on two separate occasions. We observed a burrowing owl on one occasion at a cropland site. In all instances where burrowing owl was observed on non-colonized rangeland or cropland sites, the non-colonized site was adjacent to a black-tailed prairie dog colony. The number

of burrowing owl observed at each location during any single observation event ranged from 1 to 5 individuals for the black-tailed prairie dog colonies, but only one burrowing owl was observed at each of the non-colonized rangeland sites and at the cropland site.

During breeding season avifauna surveys in 1996, we detected seven burrowing owl within strip transects on black-tailed prairie dog colonies (mean = 0.98 individuals/km; SE = 0.76), while none were detected within strip transects on non-colonized sites (Table 1). In 1997, we again detected seven burrowing owls within strip transects on prairie dog colonies during breeding season avifauna surveys (mean = 0.54 individuals/km; SE = 0.24), while no burrowing owl was detected within strip transects on non-colonized sites (Table 1). Also in 1997, we recorded a total of 60 burrowing owl, regardless of whether they were inside or outside a strip transect, during breeding season avifauna surveys. Fifty-six of these were within 17 black-tailed prairie dog colony study sites, while only four burrowing owl were detected at two non-colonized rangeland sites.

**Table 1.** Results of breeding season avifauna surveys along strip transects in black-tailed prairie dog colonies and non-colonized sites in Morton County, Kansas, and Baca County, Colorado. Relative abundance is individuals of burrowing owl/km of transect.

Year	Habitat	Number of Burrowing Owls Detected	Relative Abundance (mean $\pm$ SE)
1996	prairie dog colonies	7	0.98 $\pm$ 0.76
1996	non-colonized sites	0	0
1997	prairie dog colonies	7	0.54 $\pm$ 0.24
1997	non-colonized sites	0	0

## DISCUSSION

In the region of our study sites, black-tailed prairie dog colonies appeared to be the primary location of burrows suitable for use by burrowing owl. We observed no evidence of burrowing by the American badger (*Taxidea taxus*) during two field seasons in Morton and Baca counties, nor were individuals ever sighted. We frequently observed coyote (*Canis latrans*) in our study area but only two coyote dens were located during our study period. During the same time period swift fox (*Vulpes velox*) rarely was encountered in our study area (C. Roy, Kansas Department of Wildlife & Parks, personal communication). Indeed, during two field seasons in our study area, we recorded only one instance of a burrowing

owl using a burrow not located in a prairie dog colony. This burrow was located in a non-colonized rangeland site and its use was confirmed by the presence of regurgitated pellets, excrement, and a freshly-killed juvenile mouse at the entrance.

Although black-tailed prairie dog colonies occupied less than 2% of the land area at Cimarron National Grassland in Morton County in 1997 (J. Chynoweth, USDA Forest Service, personal communication), their use by burrowing owl during the breeding season appears to have been substantial. During the period of 2004 to 2006, black-tailed prairie dog colonies occupied approximately 5% of the land area at Cimarron National Grassland (A. Chappell, USDA Forest Service, personal communication). While the land area occupied by black-tailed prairie dog at Cimarron National Grassland has increased relative to when we collected data, an outbreak of sylvatic plague (*Yersinia pestis*) began in 2005 and continued during 2006 (Cully, unpublished data). Sylvatic plague was first documented at Cimarron National Grassland in 1997 (Cully et al. 2000). Black-tailed prairie dog is highly susceptible to plague and outbreaks often result in colony populations being completely extirpated or reduced greater than 99% (Cully and Williams 2001). Burrowing owl population declines have been correlated to population declines in black-tailed prairie dog populations caused by poisoning of black-tailed prairie dog (Desmond et al. 2000), so possibly the severely negative impact of sylvatic plague on black-tailed prairie dog could have a corresponding negative impact on burrowing owl. However, our observations indicate that recovery of black-tailed prairie dog populations from sylvatic plague is relatively rapid so impacts on burrowing owl numbers might not be significant. This remains a critical management question.

Our data indicate that burrowing owl is dependent highly on black-tailed prairie dog colonies for suitable habitat in the region of the Cimarron and Comanche National Grasslands in southwestern Kansas and southeastern Colorado. This further validates the importance of prairie dog conservation efforts. Black-tailed prairie dog serves as a keystone species (Kotliar et al. 1999), not only for burrowing owl, but to the maintenance of biodiversity within the Great Plains.

#### ACKNOWLEDGMENTS

Funding for our project was provided by the United States Fish and Wildlife Service, The United States Forest Service, and Kansas State University. Manuscript review was provided generously by E. Doxen, S. Heinz and T. O'Connell.

## LITERATURE CITED

- Butts, K. O. 1976. Burrowing owls wintering in the Oklahoma panhandle. *Auk* 93:510-516.
- Butts, K. O., and J. C. Lewis. 1982. The importance of prairie dog towns to burrowing owls in Oklahoma. *Proceedings of the Oklahoma Academy of Science* 62:46-52.
- Cully, J. F., Jr., L. G. Carter, and K. L. Gage. 2000. New records of sylvatic plague in Kansas. *Journal of Wildlife Diseases* 36:389-392.
- Cully, J. F., Jr., and E. S. Williams. 2001. Interspecific comparisons of sylvatic plague in prairie dogs. *Journal of Mammalogy* 82:894-905.
- Desmond, M. J., and J. A. Savidge. 1996. Factors influencing burrowing owl (*Speotyto cunicularia*) nest densities and numbers in western Nebraska. *American Midland Naturalist* 136:143-148.
- Desmond, M. J., and J. A. Savidge. 1999. Satellite burrow use by burrowing owl chicks and its influence on nest fate. *Studies in Avian Biology* 19:128-130.
- Desmond, M. J., J. A. Savidge, and K. M. Eskridge. 2000. Correlations between burrowing owl and black-tailed prairie dog declines: a 7-year analysis. *Journal of Wildlife Management* 64:1067-1075.
- Dickey, H. P., W. R. Swafford, and Q. L. Markley. 1963. Soil survey of Morton County, Kansas. United States Department of Agriculture Soil Conservation Service, United States Government Printing Office, Washington, District of Columbia.
- Haug, E. A., B. A. Milsap, and M. S. Martell. 1993. Burrowing owl (*Speotyto cunicularia*). In *The Birds of North America*, No. 61 (A. Poole and F. Gill, editors). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.
- James, P. C., and R. H. M. Espie. 1997. Current status of the burrowing owl in North America: an agency survey. Pp. 3-5 in *The burrowing owl, its biology and management including Proceedings of the first International Burrowing Owl Symposium* (J. L. Lincer and K. Steenhof, editors). *Journal of Raptor Research*. Report 9.
- Kotliar, N. B., B. W. Baker, A. D. Whicker, and G. Plumb. 1999. A critical review of assumptions about the prairie dog as a keystone species. *Environmental Management* 24:177-192.
- Kretzer, J. E. 1999. Herpetological and coleopteran communities of black-tailed prairie dog colonies and non-colonized areas in southwest Kansas. M.S. Thesis, Kansas State University, Manhattan.
- Kretzer, J. E., and J. F. Cully, Jr. 2001a. Prairie dog effects on harvester ant diversity and density. *Journal of Range Management* 54:11-14.
- Kretzer, J. E., and J. F. Cully, Jr. 2001b. Effects of black-tailed prairie dogs on reptiles and amphibians in Kansas shortgrass prairie. *Southwestern Naturalist* 46:171-177.

- Murphy, R. K., K. W. Hasselblad, C. D. Grondahl, J. G. Sidle, R. E. Martin, and D. W. Freed. 2001. Status of the burrowing owl in North Dakota. *Journal of Raptor Research* 35:322-330.
- NatureServe. 2006. NatureServe Explorer: an online encyclopedia of life [web application]. Version 5.0. NatureServe, Virginia. Available at <http://natureserve.org/explorer>. (Accessed: September 5, 2006).
- Orth, P. B., and P. L. Kennedy. 2001. Do land-use patterns influence nest-site selection by burrowing owls (*Athene cunicularia hypugaea*) in northeastern Colorado? *Canadian Journal of Zoology* 79:1038-1045.
- Sauer, J. R., J. E. Hines, and J. Fallon. 2005. The North American Breeding Bird Survey, results and analysis 1966-2004. Version 2005.2. USGS Patuxent Wildlife Research Center, Laurel, Maryland.
- Sidle, J. G., M. Ball, T. Byer, J. J. Chynoweth, G. Foli, R. Hodorff, G. Moravek, R. Peterson, and D. N. Svingen. 2001. Occurrence of burrowing owls in black-tailed prairie dog colonies on Great Plains National Grasslands. *Journal of Raptor Research* 35:316-321.
- Winter, S. L. 1999. Breeding bird and plant communities of black-tailed prairie dog colonies and non-colonized areas in southwest Kansas and southeast Colorado. M.S. Thesis. Kansas State University, Manhattan.
- Winter, S. L., J. F. Cully, Jr., and J. S. Pontius. 2002. Vegetation of prairie dog colonies and non-colonized shortgrass prairie. *Journal of Range Management* 55:502-508.
- Winter, S. L., J. F. Cully, Jr., and J. S. Pontius. 2003. Breeding season avifauna of prairie dog colonies and non-colonized areas in shortgrass prairie. *Transactions of the Kansas Academy of Science* 106:129-138.

*Received: 2 October 2006*

*Accepted: 21 October 2007*

*Associate Editor for Ornithology: Gregory A. Smith*



